HOW DOES ATROPIN ELEVATE THE TEMPERATURE OF THE BODY?[1]

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IF atropin is given to an animal it will cause a rise of temperature varying from 1½° F. to 6.8° F., provided the temperature of the ambient air is elevated. If, during the elevation of temperature, the sciatic is electrically irritated, a greater rise ensues. This rise after sciatic irritation is not sudden as normally takes place, but rises gradually and continues after the irritation for two hours, after which it gradually falls. It was found that while the temperature was rising the arterial tension was falling. When it was determined by the calorimeter, it was found that the increase of temperature was accompanied by an increased production and augmented dissipation of heat. I have heretofore, on account of the spinal stimulant action of atropin, inferred that the elevation of the temperature was due to spinal stimulation. To experimentally determine the seat of action I have used cats who are well suited to show the elevation of temperature. Thirteen experiments were performed. When the cord was cut at the atlas and atropin injected per jugular there was no rise of temperature. Several repeated experiments demonstrated that the rise was not spinal.

The next experiment was made after a transverse section, just in front of the medulla oblongata, the carotids being previously ligated; then a rise of temperature ensued, after the use of atropin, of about one degree. But normally a rise of temperature ensues after section in front of the medulla, because the great regulating centres of the brain have been cut off. How are we now to differentiate between the normal rise and that rise after the drug? After the atropin the rise is only one degree, but when the animal's nervous system is intact the rise is often 6.8° F. I have also made some sections in front of the pons varolii and given atropin. Here we also have a rise of temperature without atropin. With the atropin the highest rise was 2.2° F., after section in front of the pons, which is not more than would be expected normally. After careful consideration of the results, it seems to me difficult to speak accurately as to the cerebral centre affected. The slight rise of temperature after puncture of the medulla or pons varolii in the rabbit have not led me to believe in the existence of thermogenic centres in these bodies. Until we have definitely determined the existence of heat centres in these organs it seems to me useless to assume that atropin acts upon them. Although not directly connected with this subject, yet I hope it will not be amiss to speak of the value of atropin in shock, as in the preceding paper I have demonstrated that during the first hour of shock heat production is nearly zero, and as atropin is an augmentor of heat production we have an additional proof of what is practically known, that atropin is of great value in shock. Cocaine is also an accelerator of heat production and would without doubt be of great utility.

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[1] Read before Physiological Section, Pan-American Congress.

Experiment I. Cat; tracheotomy, spinal cord cut just below atlas.

P.M.	R. T.	A. T.
2.55	103	90
3.00	102	
3.05 $\frac{1}{20}$ gr. of atropin per jugular.		
3.08	101.8	90
3.25	101.0	
3.20 $\frac{1}{20}$ gr. of atropin per jugular.		
3.34	101	
4 03	100.4	
4.05 $\frac{1}{20}$ gr. of atropin per jugular.	100.4	
4.45	99	

EXPERIMENT II. CAT; TRACHEOTOMY, SPINAL CORD CUT AT SECOND CERVICAL VERTEBRA.

P.M.		R. T.	A. T.
1.15		103	98
1.40		103.2	
1.58		103.6	
2.07	$\frac{1}{40}$ gr. of atropin per jugular.		
2.20		104.5	
2.26		104.5	
2.33	$\frac{1}{40}$ gr. of atropin.	103.6	
2.43		102.7	
2.53		102.7	
3.23		100.1	

EXPERIMENT III. CAT; CAROTIDS LIGATED, TRACHEOTOMY, TRANSVERSE SECTION OF BRAIN JUST IN FRONT OF MEDULLA OBLONGATA.

P.M.		R T.	A. T.
2.53		103$\frac{2}{5}$	81
2.54	$\frac{1}{20}$ gr. atropin per jugular.		
3.00		103.6	82
3.11		104.2	
3.19		103.8	82
3.20	$\frac{1}{20}$ gr. atropin per jugular.		
3.27		103.2	
3.37		102.1	
3.47		102.1	
4.15		100.6	
4.33		100.1	
4.55		99	

EXPERIMENT IV. CAT; CAROTIDS LIGATED, TRACHEOTOMY, SECTION JUST IN FRONT OF MEDULLA OBLONGATA.

A.M.		R. T.	A. T.
10.17		104.6	90
10.18	$\frac{1}{40}$ gr. of atropin per jugular.		
10.22		104.7	92
10.27		105.1	94
10.33		104.8	
10.44		105	95
10.57		104.9	
11.07		105.2	
11.18		104.6	96
11.19	$\frac{1}{40}$ gr. per jugular.		
11.25		104	
11.30		103.4	
11.35		103.5	96

EXPERIMENT V. CAT; CAROTIDS LIGATED, TRACHEOTOMY, TRANSVERSE SECTION OF BRAIN JUST IN FRONT OF MEDULLA OBLONGATA.

P.M.		R. T.	A. T.
2.00	Before section.	102	80
2.25	After section.	103$\frac{1}{10}$	80
2.34		103	
2.45		103$\frac{1}{5}$	
2.54		103$\frac{1}{5}$	81

EXPERIMENT VI. CAT; CAROTIDS LIGATED, TRACHEOTOMY, TRANSVERSE SECTION OF BRAIN JUST IN FRONT OF MEDULLA OBLONGATA.

A.M.	R. T.	A. T.
9.50	$104\frac{8}{10}$	90
9.57	$103\frac{4}{5}$	
10.03	$103\frac{8}{10}$	
10 13	104.6	
10.17	104.6	90

EXPERIMENT VII. CAT; CAROTIDS LIGATED, TRACHEOTOMY, TRANSVERSE SECTION AT ANTERIOR EDGE OF PONS VAROLII.

A.M.		R. T.	A. T.
9.28	Before section.	102.4	75
9.37	After section.	101.6	
10.24		100.4	83
10.31		100.2	85
10.32	$\frac{1}{40}$ gr. atropin per jugular.		
10 37		100.4	86
10 43		100.3	
11 10		100.7	90
11.30		100 8	88
11.40		100 5	86

EXPERIMENT VIII. CAT; CAROTIDS LIGATED, TRACHEOTOMY, TRANSVERSE SECTION AT ANTERIOR EDGE OF THE PONS VAROLII.

P.M.		R. T.	A. T.
1.30		102	97
2.13		102.2	97
2.20		102.6	95
2.27		102.8	94
2.28	$\frac{1}{40}$ gr. atropin per jugular.		
2.30		102.8	93
2.35		103.2	92
2.44		103.2	
2.53		104.2	90
3.20		105	90
3.27		105	
3.30		105	94